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Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1 (Original): A dual-purpose sensor comprising:

a magnetoresistive current sensor having a single pair of terminals, the sensor being multiplexed under separate current conditions in a conductor adjacent to the sensor to produce both a temperature measurement and a current measurement in a vicinity of the sensor.

2 (Original): The dual-purpose sensor of Claim 1, wherein the temperature measurement and the current measurement are determined with respect to separate currents flowing in the adjacent conductor.

3 (Original): The dual-purpose sensor of Claim 1, wherein the separate current conditions comprise a first condition where a current flowing through the adjacent conductor has a value known *a priori*, and a second condition where a current flowing through the adjacent conductor has an unknown value.

4 (Original): The dual-purpose sensor of Claim 3, wherein a first resistance is measured across the single pair of terminals during the first condition to produce the temperature measurement.

5 (Original): The dual-purpose sensor of Claim 3, wherein a second resistance is measured across the single pair of terminals during the second condition to produce the current measurement in the adjacent conductor.

6 (Original): A dual-purpose sensor comprising:

a magnetoresistive current sensor having a single pair of terminals, the sensor being multiplexed to produce both a temperature measurement in a vicinity of the sensor and a current measurement in a conductor adjacent to the sensor from separate resistance measurements made across the single pair of terminals.

7 (Original): The dual-purpose sensor of Claim 6, wherein the separate resistance measurements comprise a first resistance measured across the single pair of terminals while a current flowing in the adjacent conductor is known *a priori*, and a second resistance measured across the single pair of terminals while a current flowing in the adjacent conductor is unknown.

8 (Original): The dual-purpose sensor of Claim 7, wherein the measured first resistance is used to produce the temperature measurement, the measured second resistance being used to produce the current measurement.

9 (Original): The dual-purpose sensor of Claim 7, wherein the *a priori* known current is essentially zero amperes.

10 (Original): The dual-purpose sensor of Claim 6, wherein the magnetoresistive sensor is a giant magnetoresistive sensor.

11 (Withdrawn):The dual-purpose sensor of Claim 6, wherein the magnetoresistive sensor is an anisotropic magnetoresistive sensor.

12 (Original): A sensor system that produces a current measurement and a temperature measurement comprising:

means for sensing current magnetoresistively,

means for measuring resistance in the current sensing means, and

means for controlling a current in a conductor adjacent to the current sensing means, wherein the controlling means multiplexes the current sensing means to produce the temperature measurement in a vicinity of the sensor and the current measurement of the current in the adjacent conductor.

13 (Original): The sensor system of Claim 12, wherein the controlling means provides separate current conditions in the adjacent conductor, such that the sensor system produces the temperature measurement and the current measurement under respective ones of the separate current conditions using the current-sensing means and the resistance measuring means.

14 (Original): A sensor system that provides current and temperature measurements comprising:

a magnetoresistive current sensor adjacent to a conductor;

a resistance sensing subsystem connected to a single pair of terminals of the current sensor; and

a controller connected to control current flowing in the conductor.

15 (Original): The sensor system of Claim 14, wherein the controller controls a current flowing in the conductor during separate current conditions, the resistance sensing subsystem measuring a resistance across the single pair of terminals of the current sensor in response to the current flowing in the conductor during the separate current conditions.

16 (Original): The sensor system of Claim 15, wherein the controller is connected to a subsystem output of the resistance sensing subsystem, the controller comprising a computer program that, when implemented, converts the resistance measurement from the subsystem output into either a temperature measurement or a current measurement depending on the current condition.

17 (Original): The sensor system of Claim 15, wherein the controller sets the current flowing in the conductor to a known current value in a first current condition, while the resistance sensing subsystem measures a first resistance of the current sensor, such that the sensor system produces a temperature measurement in a vicinity of the current sensor.

18 (Original): The sensor system of Claim 15, wherein the controller allows the current flowing in the conductor to have an unknown current value in a second current condition, while the resistance sensing subsystem measures a second resistance of the current sensor, such that the sensor system produces a current measurement of the unknown current value in the conductor.

19 (Withdrawn): A method of measuring temperature and current, the method comprising:

measuring a first resistance of a magnetoresistive sensor while a first current is flowing in a conductor adjacent to the sensor, the first current having a known value, the first resistance being measured using a single pair of terminals of the sensor; and

measuring a second resistance of the magnetoresistive sensor while a second current is flowing in the conductor, the second current having an unknown value, the second resistance being measured using the single pair of terminals of the sensor,

wherein the measured first resistance is used to produce a temperature measurement, the measured second resistance being used to produce a current measurement.

20 (Withdrawn): The method of Claim 19, further comprising using a relationship between resistance of the magnetoresistive sensor and temperature to determine the temperature measurement.

21 (Withdrawn): The method of Claim 19, further comprising using a relationship between resistance of the magnetoresistive sensor and the second current or a magnetic field produced by the second current to determine the current measurement.

22 (Withdrawn): A method of measuring temperature and current with a magnetoresistive sensor, the method comprising:

setting a current flowing in a conductor adjacent to the magnetoresistive sensor to a known value;

measuring a first resistance of the sensor while the current having the known value is flowing to produce a temperature measurement in a vicinity of the sensor;

allowing the current flowing in the conductor to have an unknown value; and

measuring a second resistance of the magnetoresistive sensor while the current having the unknown value is flowing in the conductor to produce a current measurement of the unknown current value.

23 (Withdrawn): The method of Claim 22, further comprising calibrating the magnetoresistive sensor, such that the calibration comprises an *a priori* relationship between resistance of the sensor and temperature and an *a priori* relationship between resistance of the sensor and current or magnetic field produced by the current, the respective *a priori* relationships being used to produce the temperature measurement and the current measurement.

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